GOES-R Program Update

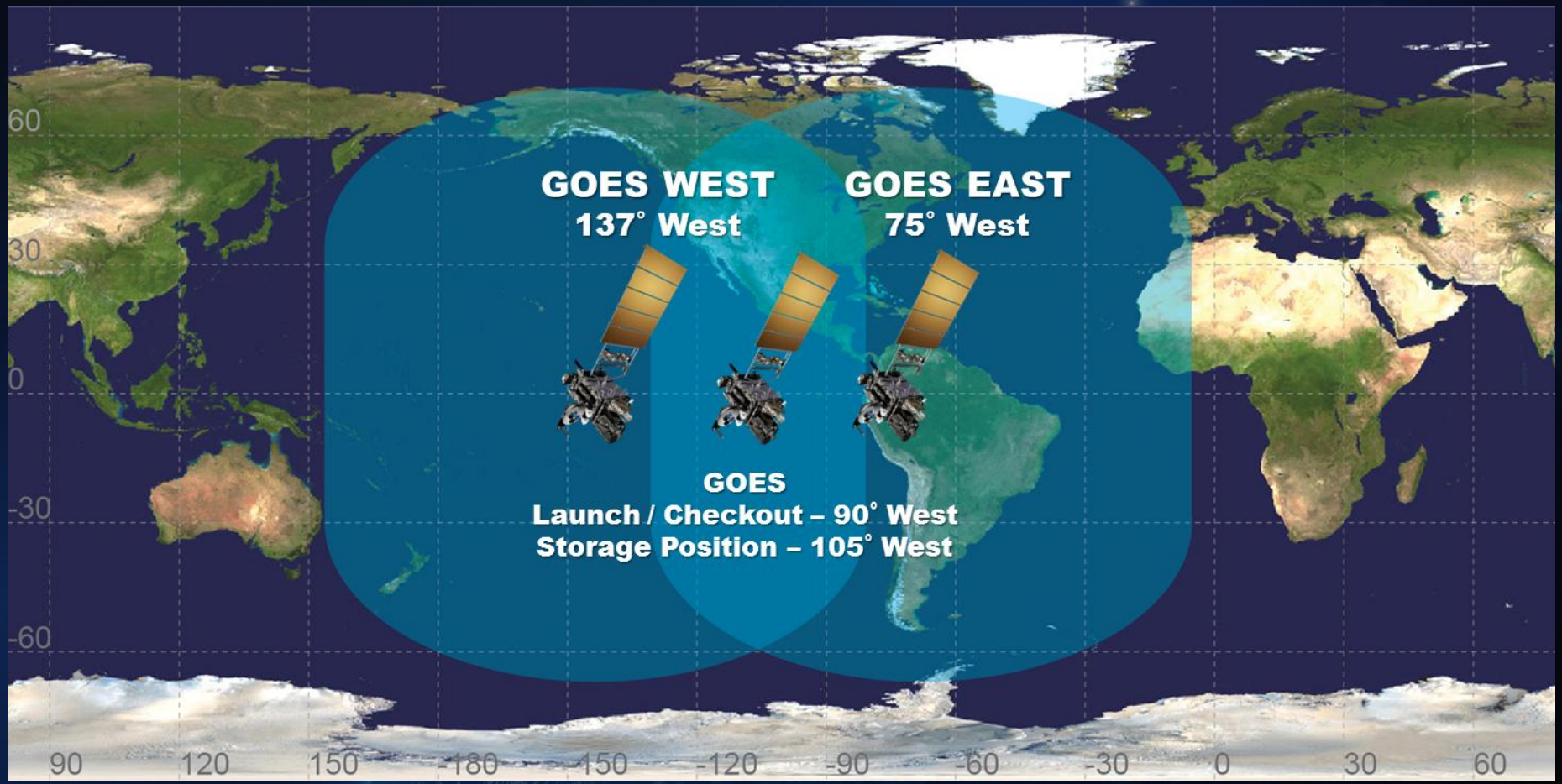
Greg Mandt

GOES-R System Program Director

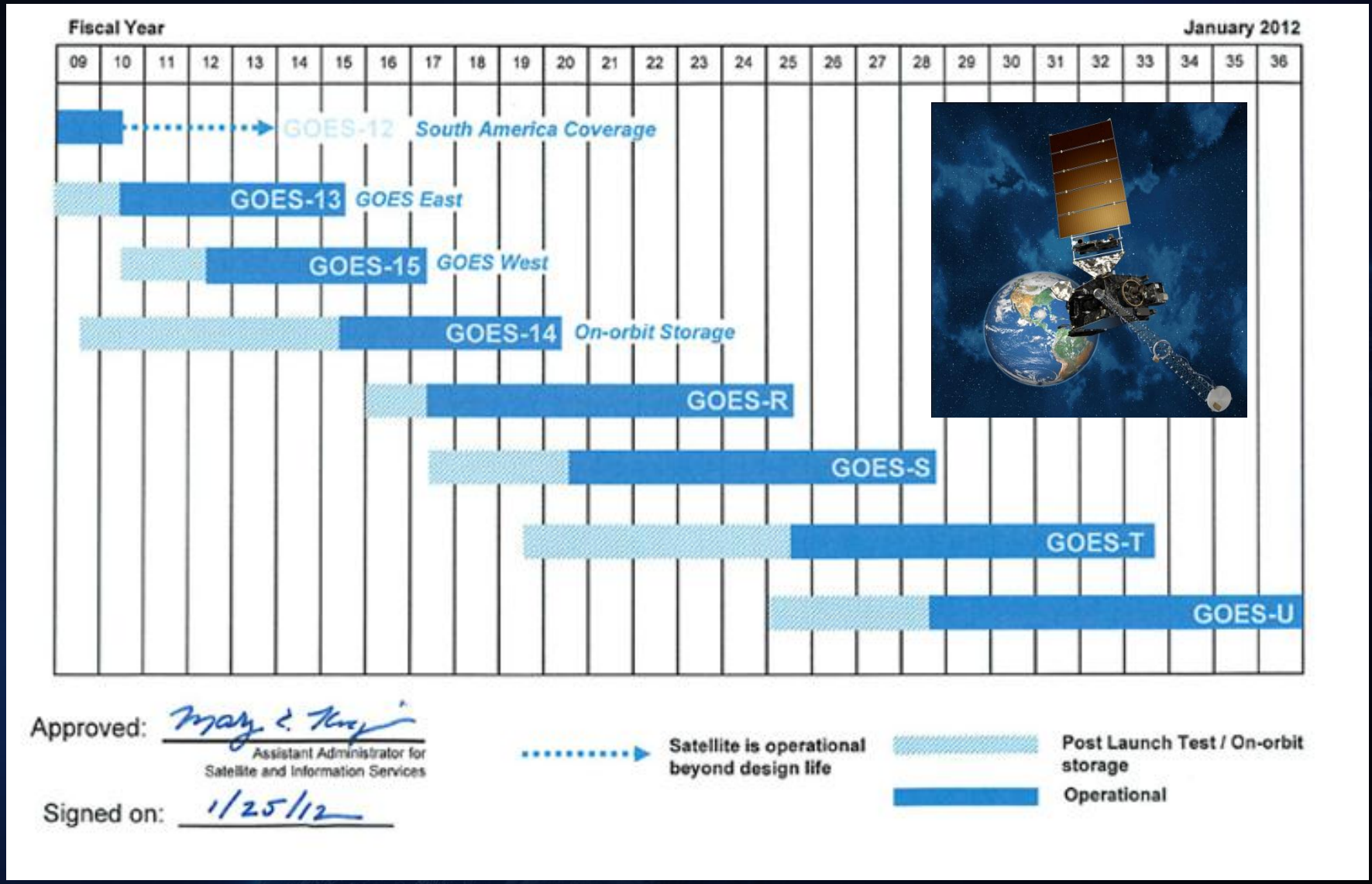
NOAA Satellite Science Week

April 30, 2012

GOES Fleet


GOES WEST
137° West
GOES EAST
75° West
GOES
Launch / Checkout – 90° West
Storage Position – 105° West
60
30
0
-30
-60
90
120
150
-180
-150
-120
-90
-60
-30
0
30
60

Continuity of GOES Operational Satellite Program



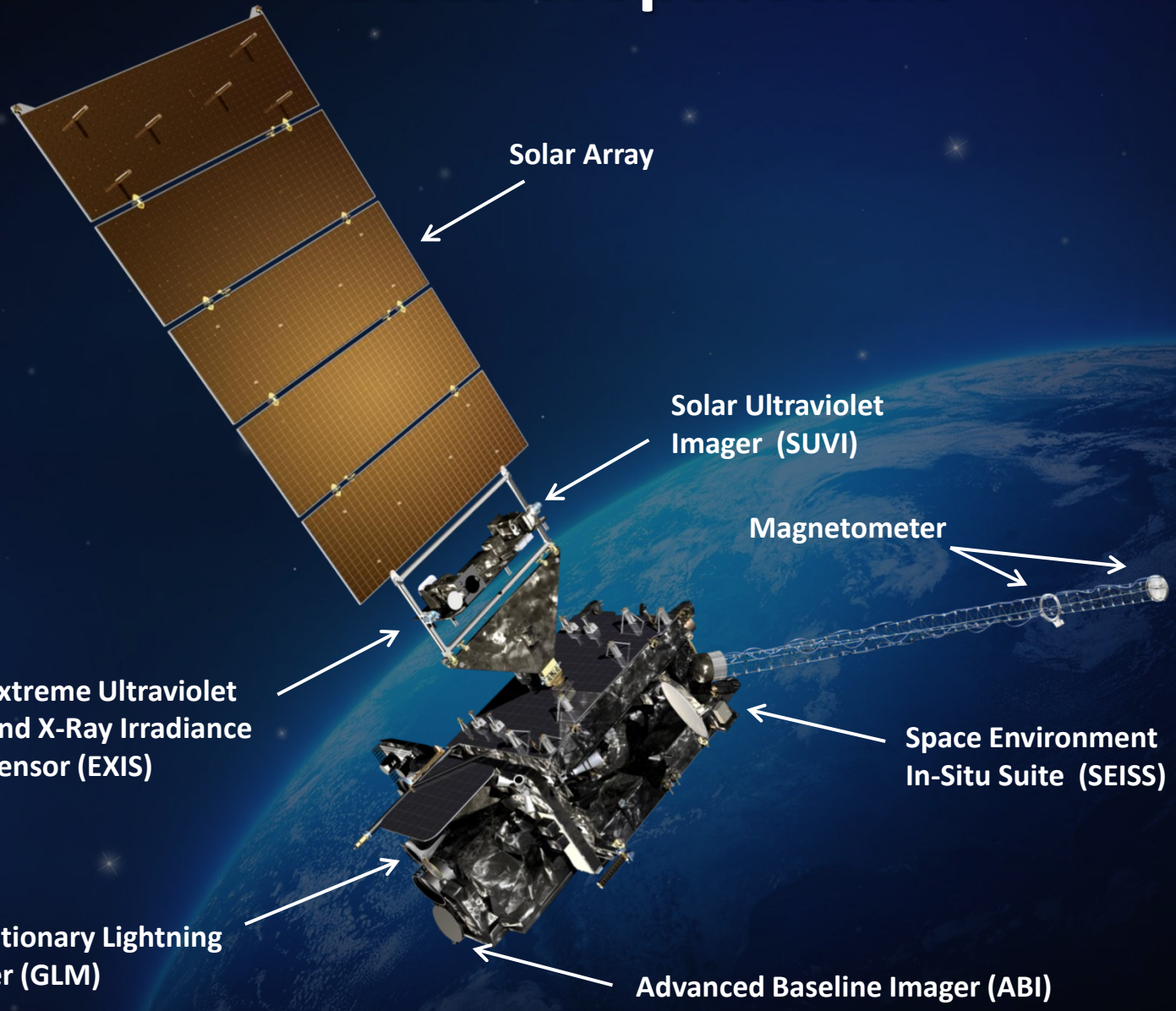
GOES–R Milestones

	2010	2011	2012	2013	2014	2015
Program/ System	✓ System Design Review complete	✓ Mission PDR Part I	✓ Mission PDR Part II ● Mission CDR	Launch Readiness Oct. 2015		
Flight Segment – Spacecraft	✓ S/C SDR complete	✓ S/C PDR complete	✓ S/C CDR			
Flight Segment – Instruments	✓ All instruments have passed CDR	✓ ABI Delta CDR complete		● ABI Delivery ● EXIS Delivery ● GLM Delivery ● MAG Delivery ● SEISS Delivery ● SUVI Delivery		
Ground Segment	✓ Core GS PDR completed ✓ Antenna System PDR completed ✓ 100 % delivery of baseline product algorithms	✓ Antenna System CDR ✓ GS Project PDR complete	✓ Core GS CDR ✓ ESPDS CDR ● CLASS CDR ● GS Project CDR	● RBU/NSOF/WCDAS installation ● WCDAS complete ● RBU complete ● NSOF complete		

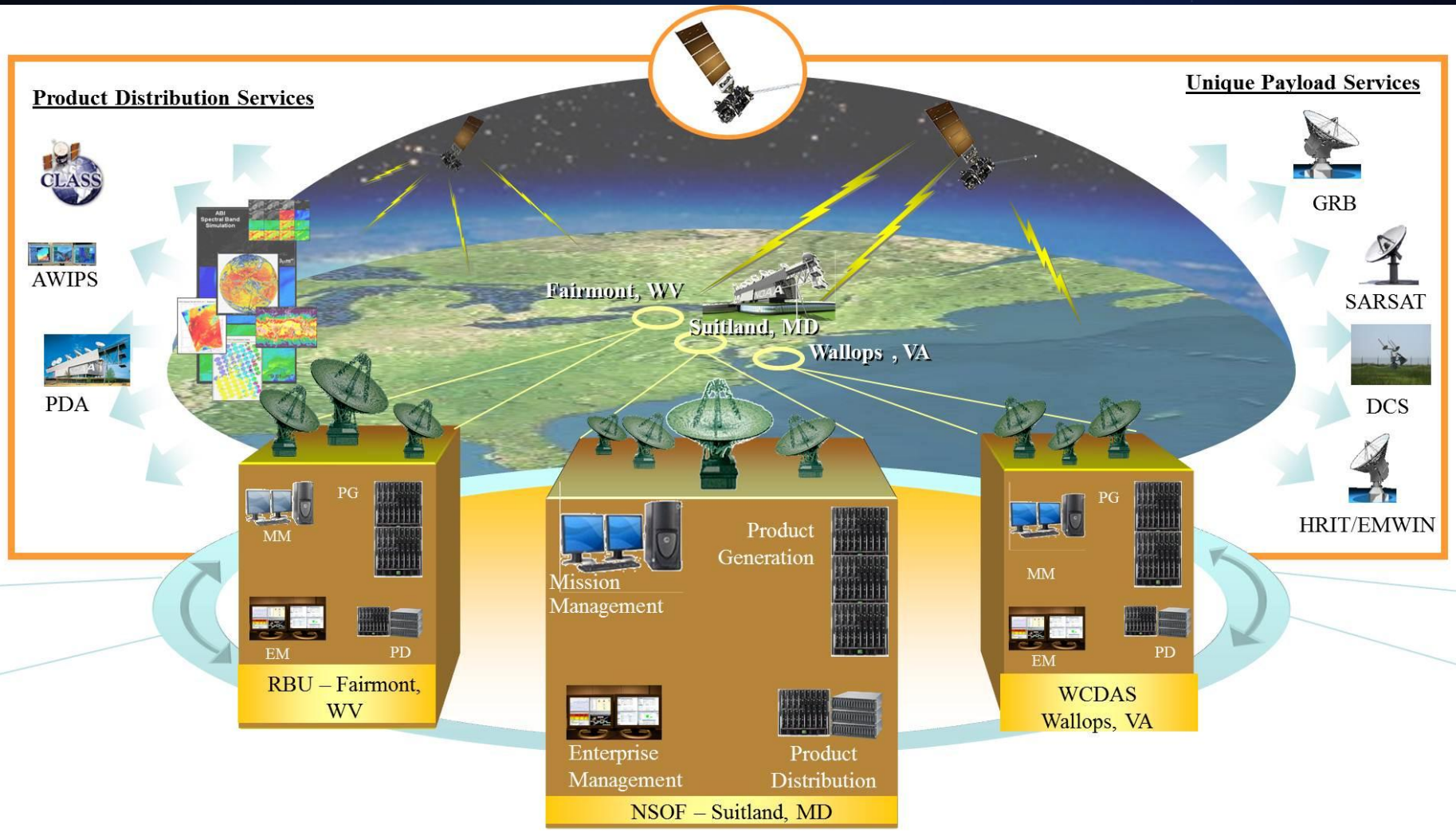
Development → Integration and Testing

GOES-R Spacecraft

GOES-R Spacecraft



GOES-R Architecture



Program Updates

- User Readiness Plan completed February 2012
- Live Media Event at Goddard April 3, 2012
  - 2012 tornado season
  - More than 40 stations across the country participated including the Weather Channel
- GOES-R/S Launch contract awarded to United Launch Services, LLC on April 5, 2012
- GRB downlink specifications to be released in August 2012
- GRB simulator in development
  - May 2013 availability

GOES-R Products

Baseline Products

Advanced Baseline Imager (ABI)

- Aerosol Detection (Including Smoke and Dust)
- Aerosol Optical Depth (AOD)
- Clear Sky Masks
- Cloud and Moisture Imagery
- Cloud Optical Depth
- Cloud Particle Size Distribution
- Cloud Top Height
- Cloud Top Phase
- Cloud Top Pressure
- Cloud Top Temperature
- Derived Motion Winds
- Derived Stability Indices
- Downward Shortwave Radiation: Surface
- Fire/Hot Spot Characterization
- Hurricane Intensity Estimation
- Land Surface Temperature (Skin)
- Legacy Vertical Moisture Profile
- Legacy Vertical Temperature Profile
- Radiances
- Rainfall Rate/QPE
- Reflected Shortwave Radiation: TOA
- Sea Surface Temperature (Skin)
- Snow Cover
- Total Precipitable Water
- Volcanic Ash: Detection and Height

Geostationary Lightning Mapper (GLM)

- Lightning Detection: Events, Groups & Flashes

Space Environment In-Situ Suite (SEISS)

- Energetic Heavy Ions
- Magnetospheric Electrons & Protons: Low Energy
- Magnetospheric Electrons: Med & High Energy
- Magnetospheric Protons: Med & High Energy
- Solar and Galactic Protons

Magnetometer (MAG)

- Geomagnetic Field

Extreme Ultraviolet and X-ray Irradiance Suite (EXIS)

- Solar Flux: EUV
- Solar Flux: X-ray Irradiance

Solar Ultraviolet Imager (SUVI)

- Solar EUV Imagery

Future Capabilities

Advanced Baseline Imager (ABI)

- Absorbed Shortwave Radiation: Surface
- Aerosol Particle Size
- Aircraft Icing Threat
- Cloud Ice Water Path
- Cloud Layers/Heights
- Cloud Liquid Water
- Cloud Type
- Convective Initiation
- Currents
- Currents: Offshore
- Downward Longwave Radiation: Surface
- Enhanced “V”/Overshooting Top Detection
- Flood/Standing Water
- Ice Cover
- Low Cloud and Fog
- Ozone Total
- Probability of Rainfall
- Rainfall Potential
- Sea and Lake Ice: Age
- Sea and Lake Ice: Concentration
- Sea and Lake Ice: Motion
- Snow Depth (Over Plains)
- SO_2 Detection
- Surface Albedo
- Surface Emissivity
- Tropopause Folding Turbulence Prediction
- Upward Longwave Radiation: Surface
- Upward Longwave Radiation: TOA
- Vegetation Fraction: Green
- Vegetation Index
- Visibility

Future Capability Products: Path Forward

- GOES-R Program is addressing Future Capabilities through the Risk Reduction Science Program
  - GOES-R AWG will complete delivery of the tested Algorithm Theoretical Basis Documents (ATBDs) and test data sets
  - These materials are available to users at NOAA's discretion
  - Discussions with NWS and the advisory groups during Science Week will determine the priority and path forward
- All data necessary to produce these future capability products are available to users
  - GOES-R produced data and ancillary data (external sources) will be available through the CLASS system
  - Currently evaluating the optimum method for making the algorithms available to users

GOES-R User Readiness

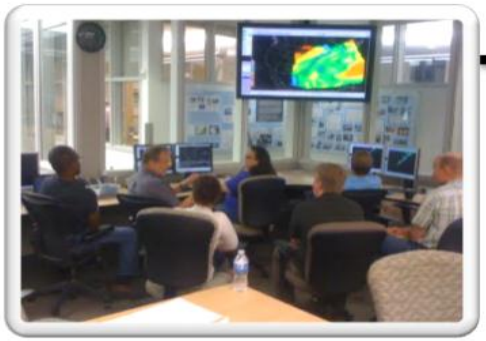
- Expanded User Community content at **http://www.goes-r.gov/users/user-readiness-overview.html**
- GOES-R Facebook page (**https://www.facebook.com/GOESRsatellite**)
- GOES-R Proving Ground
  - Demonstrations
  - CIMMS, CIRA, SPoRT, HWT blogs
- Visiting Scientist Program
- Forecaster Feedback
- Training and Outreach
- Fact sheets
- Tri-fold brochure
- User Readiness Plan completed February 2012

The GOES-R Proving Ground

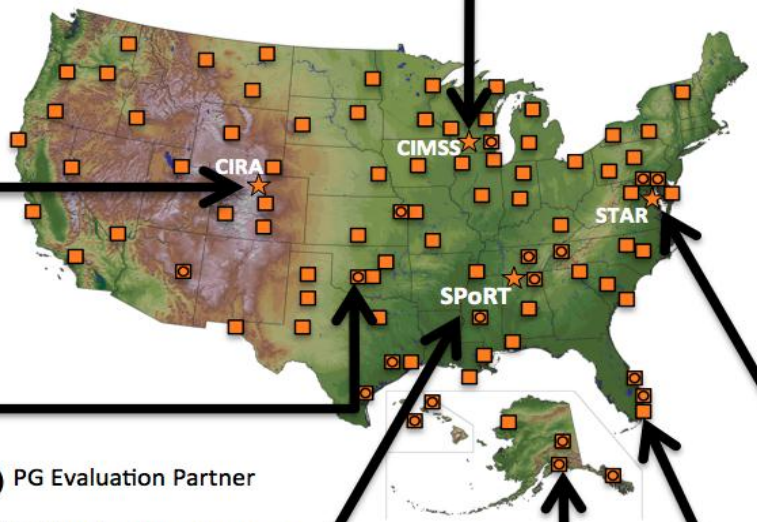
- Collaborative effort between the GOES-R Program Office, selected NOAA Cooperative Institutes, NWS forecast offices, NCEP National Centers, NASA SPoRT, JCSDA, and NOAA Testbeds
- Responsible for user readiness testing of GOES-R baseline products and future capabilities prior to launch
- Where proxy and simulated GOES-R products are tested, evaluated, and integrated into operations before the GOES-R launch
  - Satellite Champions at NWS National Centers
  - Develop training for users
  - Prepare for display within AWIPS/AWIPS-II/N-AWIPS
  - Initial focus on High Impact Weather and warning related products requested by NWS
- A key element of GOES-R User Readiness (Risk Mitigation)
- Proving Ground activities are having an impact **NOW!**

The GOES-R Proving Ground

CIRA - Ft. Collins, CO
ABI Simulated Natural Color



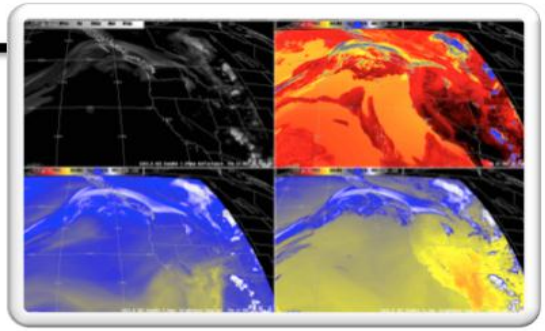
SPC – Oklahoma City, OK
Nearcast Training at the Hazardous Weather Testbed



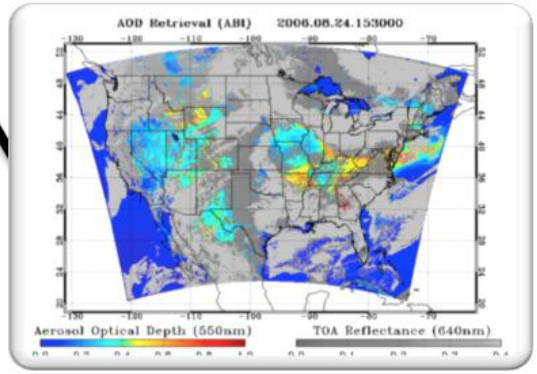
PG Evaluation Partner

PG Product Development Partner

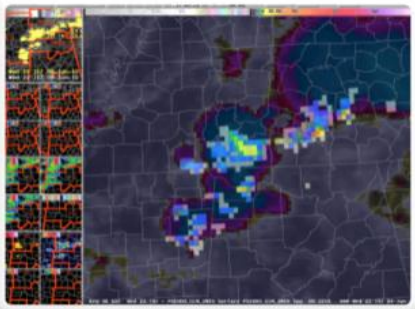
Cooperative Institute



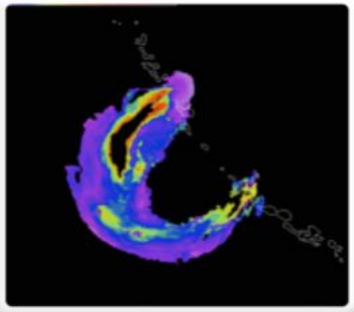
CIMSS – Madison, WI
Simulated ABI Bands



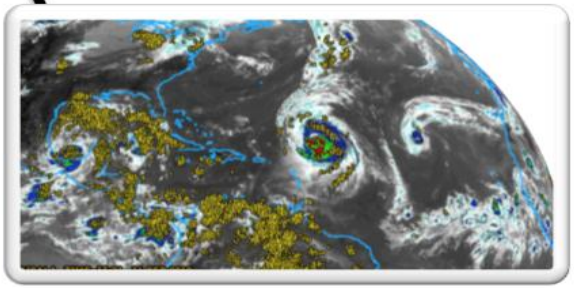
STAR – Camp Springs, MD
Aerosol Optical Depth Product



SPoRT – Huntsville, AL
GLM Lightning Flash Density

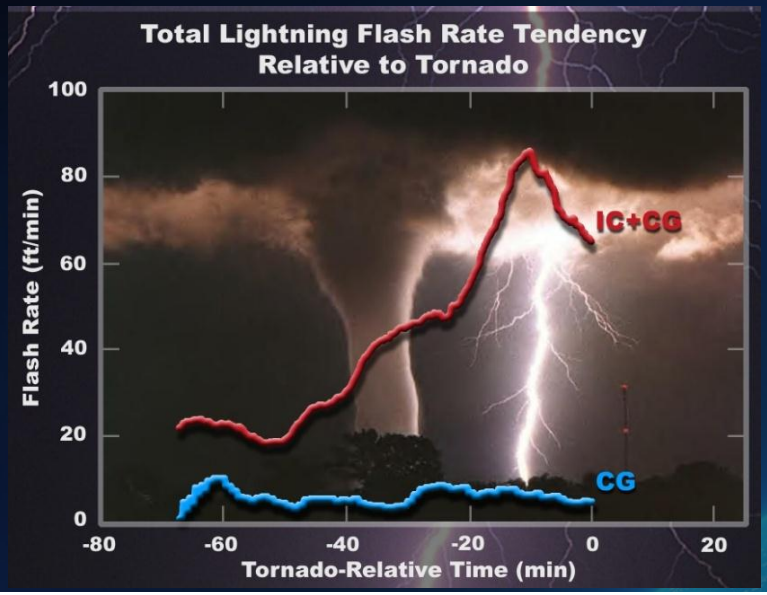


AFC – Anchorage, AK
Volcanic Ash Product



NHC – Miami, FL Rapid Intensification Index

Lightning Detection



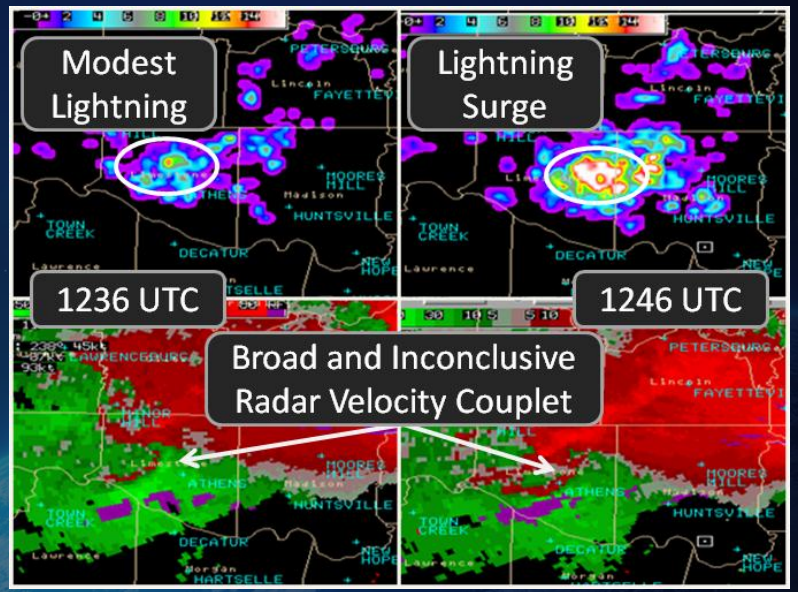


TABLE 3. Skill scores and average lead times using the sample set of 711 thunderstorms for both total lightning and CG lightning, correlating trends in lightning to severe weather.

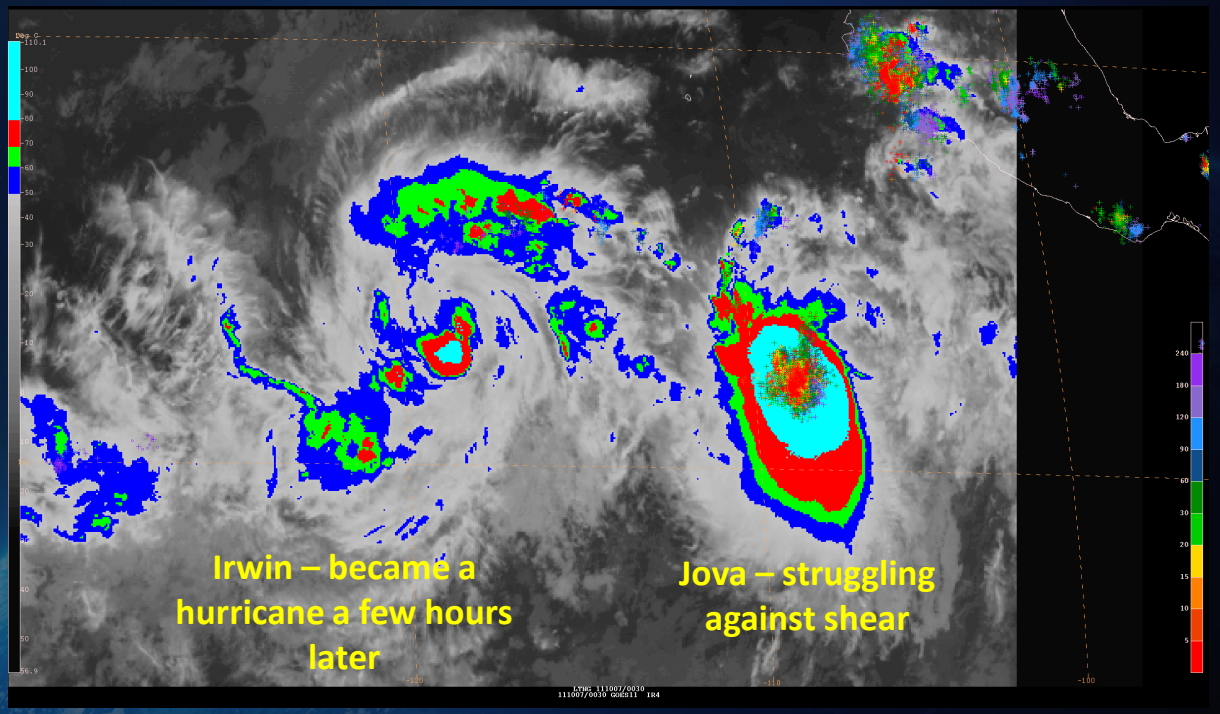
	POD	FAR	CSI	HSS	lead time (all)	lead time (tornado)
Total lightning	79%	36%	55%	0.71	20.65 mins	21.32 mins

National Average for Tornado warning lead-time is only 13 minutes

An operational demonstration of the total lightning algorithm at the Hazardous Weather Testbed (at request of NWS) began in early April and is currently in progress.

A Recent Example of Lightning in Eastern Pacific Tropical Cyclones

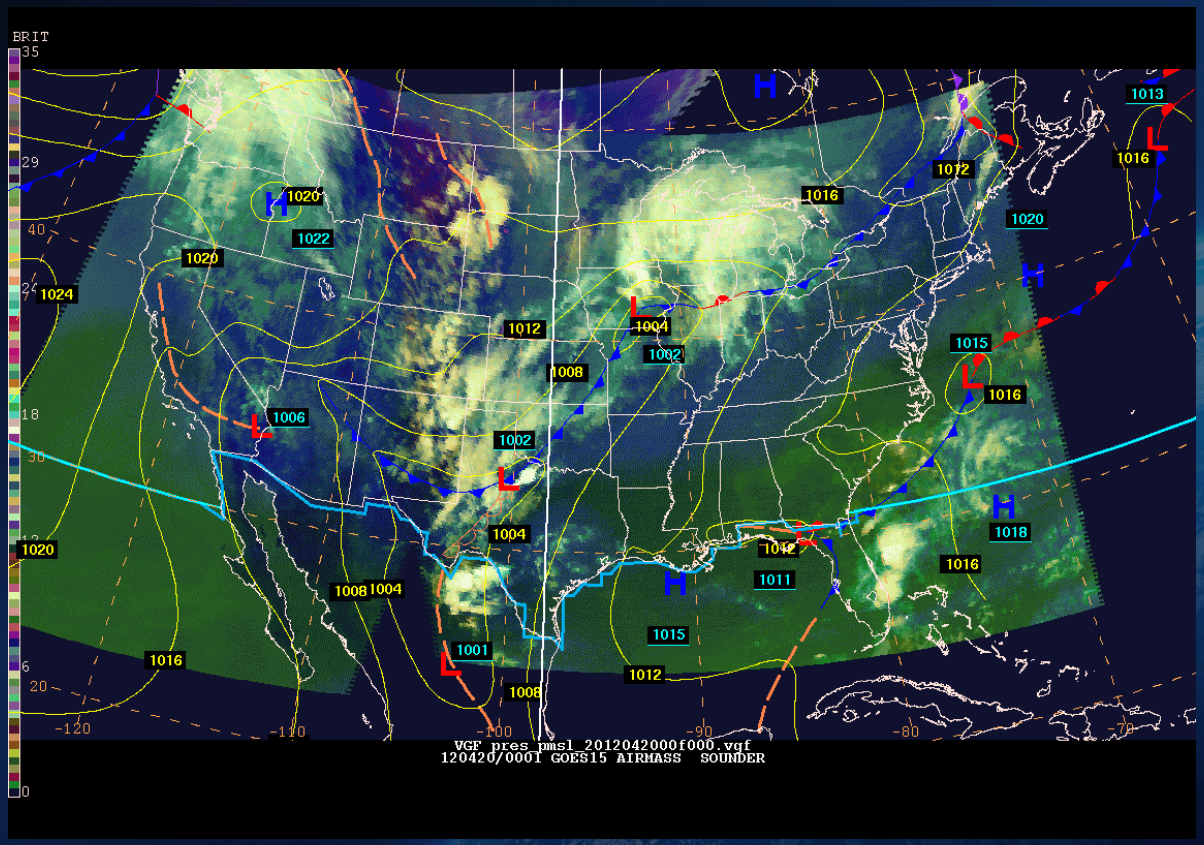
- Lightning activity from tropical storm Jova (the eastern storm) was much greater than that of Irwin (the western storm).
- The storm with less lightning (Irwin) intensified much more than the storm with more lightning (Jova), consistent with the rapid intensification index being demonstrated during the NHC Proving Ground
- Lightning outbreaks near the center are often associated with environmental vertical shear, which prevents intensification.
- In part from the experience being gained in the GOES-R Proving Ground, the NHC forecaster recognized that the increased lightning near the storm usually does not signal intensification.



Example from Oct. 7, 2011 during the 2011 GOES-R Proving Ground Experiment at the National Hurricane Center courtesy of Jack Beven (NWS/NHC) and Mark DeMaria (NESDIS/STAR)

SAB mention of the GOES-Sounder RGB Air Mass Product for the 4/22/12 Nor'easter

00z 04/20 - 23z 04/23



DEVELOPMENTAL GOES RGB IMAGERY REALLY SHOWING THIS EVOLUTION AND RAPID INTENSIFICATION OF NRN STREAM PIECE OF ENERGY WELL THE PAST FEW HRS. THIS EVIDENT BY INTRUSION OF STRATOSPHERIC AIR/DEVELOPMENT OF A STRONG JET OVER ERN MO/SRN IL/KY/TN AND DEVELOPMENT OF COLD POOL OVER WI/MI/IN/NRN IL. MEANWHILE, THESE SAME FEATURES WITH SRN STREAM UL LOW HAVE BECOME LESS DEFINED AND SUGGEST THIS PIECE OF ENERGY MAY BE WEAKENING. SO WOULD EXPECT, NRN STREAM PIECE OF THE PUZZLE TO BECOME MAIN INFLUENCING FACTOR IN WHAT HAPPENS WITH PRECIP/SFC LOW HEADING THROUGH THE NEXT FEW HRS.

Courtesy of Michael Folmer (CICS Satellite Champion at HPC/OPC/SAB)

- Josh Newhard
NESDIS/OSPO
Satellite Analysis Branch

GOES-R Visiting Scientist Program

- 10 Visiting Scientists have been selected in 2012 for 1-4 week visits to exchange ideas and initiate/continue collaborations applicable to their current research with other scientists and end users

- Scientist exchanges among NWS Centers and regions, NOAA Cooperative Institutes, national laboratories, and other partners
  - Continuing cooperation with EUMETSAT, Environment Canada, and others

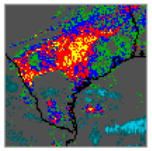
GOES-R Science Team members participated in the Convection Working Group meeting in Prague, Czech Republic, March 27-30, 2012

Training and Education

Online Training Modules

- GOES-R: Benefits of Next-Generation Environmental Monitoring (COMET)
- GOES-R 101
- Satellite Hydrology and Meteorology for Forecasters (SHyMet)
- SPoRT product training modules
- Commerce Learning Center

TRAINING

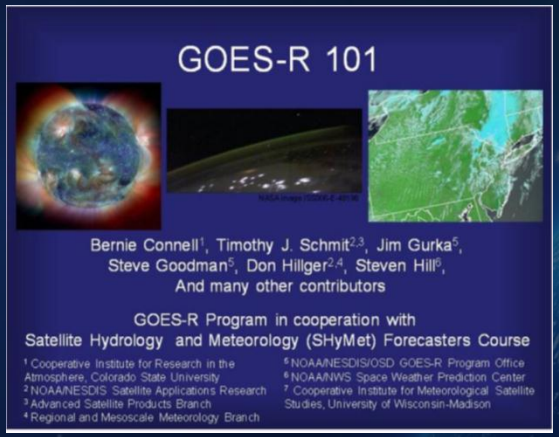


GOES Fog Depth
Download *(for NWS users)*
Launch in browser
(user guide)

This training module focuses on the use of the Fog Depth product within the GOES Aviation suite provided through a collaboration between SPoRT and NESDIS. The use of this product along with the Low Cloud Base product is demonstrated in support of aviation forecasts of ceiling and visibility. This module takes 16 minutes to complete and requires the flash plug-in. (May 2008)

Printed Materials

- GOES-R Fact Sheets (17)
- GOES-R Tri-fold



Outreach Projects (with NWSFOs)

- COMET will reach out to the GOES-R Proving Ground Partners and connect them with university faculty to use current and prototype data products for the purpose of building a bridge from products that are currently available to those that will become available when GOES-R is launched.

Training Status: Jim Gurka – Mon, Apr 30, 4:35 PM

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | NOAA SATELLITE AND INFORMATION SERVICE

Save the Date

"Strengthening Partnerships to Enhance User Readiness, Reception, and Utility"

You are cordially invited to join us for
this engaging event focused on users

NOAA Satellite Conference
April 8-12, 2013
Miami, Florida

http://satelliteconferences.noaa.gov/Miami2013

NOAA Satellite Conference

for Direct Readout, GOES/POES, and GOES-R/JPSS Users

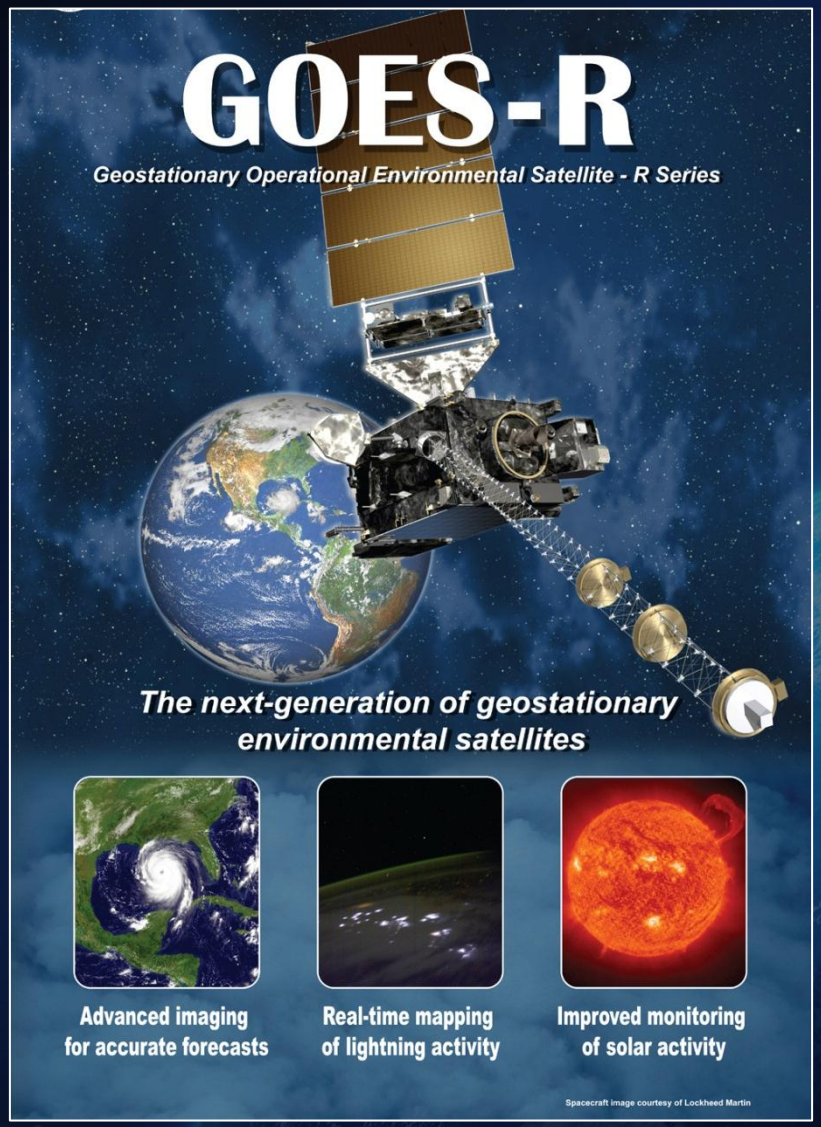
GOALS:

Enhance user access, reception and readiness for data, technology, and applications from current and future environmental satellite constellations

Improve use of satellite data by leveraging advances in science, applications development, data fusion, and visualization

Promote interaction, coordination, and communication between and among environmental satellite programs

http://satelliteconferences.noaa.gov/Miami2013



Thank you!

Any ???

For more information visit www.goes-r.gov

Follow us on Facebook

www.facebook.com/GOESRsatellite